

REMARKS

The present application is directed to a method for applying a reactive epoxy-containing coating to a substrate by subjecting the substrate to a pulsed plasma discharge, wherein the average power of the pulsed plasma discharge is less than $0.05\text{W}/\text{cm}^3$ in the presence of a compound of formula (I) or (IA), where R^1 and R^{1a} is a hydrocarbyl group optionally substituted by a halo group or a heterocyclic group; R^2 is straight or branched alkylene chain optionally substituted by a halo group; and Y is oxygen or a bond. Surfaces obtained in this way may subsequently be derivatized or adhered to other surfaces.

Claims 1-4, 6-8 and 12-21 were pending prior to the Final Office Action mailed September 28, 2005. Claims 8 and 13-20 are withdrawn from consideration as being directed to an non-elected group. Claims 5-6 and 9-11 are canceled without prejudice. Claim 1 is currently amended. Following entry of this amendment Claims 1-4, 7-8 and 12-21 will be pending. No new matter is added and support for the amendments is found throughout the specification and in the original claims.

Claim rejections 35 U.S.C. §112, First paragraph

In the Office Action mailed September 28, 2005 the Examiner rejected Claims 1-4, 6, 12 and 21 under 35 U.S.C §112, first paragraph, as failing to comply with the written description requirement. Applicants respectfully submit that the amendments to the claims overcome the rejection.

Claim 1 is amended herein to specify that the average power of the pulsed plasma discharge is less than $0.05\text{W}/\text{cm}^3$. Support for this amendment can be found on page 6, lines 10-12 and original Claim 6 of the instant application.

Accordingly, applicants respectfully submit that independent Claim 1 and dependent Claims 2-4, 12 and 21 comply with the written description requirement and request withdrawal of the Examiner's rejection. Claim 6 is canceled herein without prejudice.

Claim rejections 35 U.S.C. §103 (a)

In the Office Action mailed September 28, 2005, the Examiner rejected Claims 1-4, 6-7, 12 and 21 under 35 U.S.C §103(a) as being unpatentable over Connell (UK 1,037,144 hereinafter “Connell”) in view of Timmons *et al.* (U.S. 5,876,753 hereinafter “Timmons”). Applicants respectfully submit that the amendments to the claims overcome the Examiner’s rejection.

As mentioned above, Claim 1 has been amended to specify that the average power of the pulsed plasma discharge is less than $0.05\text{W}/\text{cm}^3$. Support for this amendment can be found on page 6, lines 10-12 and original Claim 6 of the instant application. Claim 6 is cancelled without prejudice. Claims 2-4, 7, 12 and 21 depend, directly or indirectly, from amended Claim 1.

Connell discloses a method for plasma deposition of glycidyl methacrylate. However, Connell fails to disclose the use of a pulsed plasma discharge as required in Claim 1 and, therefore, is not concerned with the average power of the pulsing regime. Applicants respectfully submit Connell certainly fails to teach or suggest a pulsed plasma discharge in which the average power of the pulsed plasma discharge is less than $0.05\text{W}/\text{cm}^3$ as set forth in amended Claim 1. The deficiencies of Connell are not satisfied by Timmons for at least the following reasons.

Timmons fails to teach or suggest the particular coating **compounds** and fails to teach the use of **low** energy densities as set forth in the claimed method. Specifically, Timmons fails to teach an average power of the pulsed plasma discharge of less than $0.05\text{ W}/\text{cm}^3$ as set forth in amended Claim 1.

In addition, Timmons **teaches away** from using **low** pulsed plasma discharge, as claimed in the present method, by stating that the use of pulsed low duty cycles resulted in the production of relatively unstable plasmas and/or exceptionally low deposition rates (see Example 9, column 20, lines 26-30, of Timmons).

Example 1 (and Figure 1) of the present application shows that a compound (glycidyl methacrylate) falling within the formula of Claim 1 can be successfully deposited using pulses of extremely **low** mean power (0.04W) see page 9, lines 22-25. Examples 4 and 5 of the present application describe attempts to deposit the compounds suggested by Timmons as being suitable for use in plasma deposition (ally glycidyl ether or butadiene monoxide), under the same **low** mean power conditions. The compounds suggested by Timmons deposited at exceptionally **slow** rates compared to the compounds utilized in the claimed method. Furthermore, both of the compounds described by Timmons lost a substantial amount of epoxy functionality (see page 17, line 27-page 18, line 2 and page 18, lines 9-10 of the instant application). These results are consistent with comments presented in Example 9 of Timmons that **teaches away** from the use of less energetic conditions, because Timmons concludes that such conditions result in the production of relatively **unstable** plasma and/or exceptionally **low** deposition rates. It is to the applicants' credit that the claimed method shows **unexpected advantages** over the work of Timmons.

There is nothing in the disclosures of either Connell or Timmons to encourage one skilled in the art to use a pulsed plasma discharge of **low** average power with the selected group of **compounds** as set forth in amended Claim 1 to achieve successful deposition of a reactive epoxy-containing coating on a substrate as unexpectedly achieved by applicants. Accordingly, applicants submit that Claims 1-4, 7, 12 and 21 are not anticipated nor rendered obvious by the teachings of Connell or Timmons, alone or in combination.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some **suggestion or motivation**, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a **reasonable expectation of success**. Finally, the prior art reference (or references when combined) **must teach or suggest all the claim limitations**. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Applicants respectfully submit that if one of ordinary skill in the art were to combine the teachings of Connell and Timmons one would not derive the claimed invention. Both Timmons and Connell fail to teach or suggest a **pulsed plasma discharge of less than $0.05\text{W}/\text{cm}^3$** . Clearly, Timmons and Connell fail to teach all of the claimed limitations.

Additionally, there is no reasonable expectation of success. Based on the teachings of Timmons, one of ordinary skill in the art would not be encouraged to use **low** pulsed plasma discharge because pulsed low duty cycles resulted in the production of relatively **unstable** plasmas and/or exceptionally **low** deposition rates. Therefore, there is no *prima facie* case of obviousness regarding a method for applying a reactive epoxy-containing coating to a substrate as claimed in the present application. For at least the foregoing, applicants respectfully submit that they have overcome the Examiner's rejection under 35 U.S.C. 103(a) and request withdrawal thereof.

In the Office Action mailed September 28, 2005 the Examiner rejected Claims 1-4, 6-7, 12 and 21 under 35 U.S.C §103(a) as being unpatentable over Timmons (described above) in view of Kolluri (U.S. Patent 5, 723,219, hereinafter "Kolluri"). Claim 6 has been cancelled without prejudice, and Claims 2-4, 7, 12 and 21 depend, directly or indirectly, from amended Claim 1. Applicants respectfully submit the amendments to the claims overcome the Examiner's rejection.

As explained above, Timmons fails to teach or suggest applicants' epoxy formula compounds in combination with an average power of the pulsed plasma discharge of less than $0.05\text{ W}/\text{cm}^3$, and Timmons teaches away from the use of **low** pulsed plasma discharges as claimed in amended Claim 1.

The deficiencies of Timmons are not satisfied by Kolluri for at least the following reasons. Kolluri discloses plasma deposited three-dimensional functional film networks (a plurality of discharge plasma layers wherein a first layer comprises a plurality of first functional groups, and a second layer comprises a plurality of second functional groups) with increased surface functional density compared to plasma deposited monolayers. The

first/second functional group can be derived from a variety of monomers, including glycidyl methacrylate. Use of pulsed plasma discharge is disclosed, but only at **high** power (100W) and duty cycle 1:10. There is no teaching or suggestion by Kolluri for the use of **low** pulsed plasma discharges and certainly no teaching of an average power of the pulsed plasma discharge of less than 0.05 W/cm^3 as claimed in amended Claim 1.

Applicants respectfully assert that both Kolluri and Timmons fail to teach all the claimed limitations and that there is no reasonable expectation of success based on the teaching of Timmons or Kolluri, alone or in combination. Therefore, there is no *prima facie* case of obviousness regarding a method for applying a reactive epoxy-containing coating to a substrate as claimed herein.

Accordingly, applicants respectfully submit that Claims 1-4, 7, 12 and 21 are not anticipated nor rendered obvious by Timmons or Kolluri, either alone or in combination. For at least the foregoing, applicants respectfully submit that they have overcome the Examiner's rejection under 35 U.S.C. 103(a) and request withdrawal thereof.


CONCLUSION

The foregoing is submitted as a full and complete Response to the Final Office Action mailed on September 28, 2005. For at least the reasons given above, applicants respectfully submit that the pending claims are allowable. Accordingly, applicants submit that the claims are in condition for allowance, and such action is courteously solicited.

If the Examiner believes there are other issues that can be resolved by telephone interview, or that there are any informalities remaining in the application which may be corrected by Examiner's Amendment, a telephone call to the undersigned attorney at (404) 815-6500 is respectfully solicited.

No additional fees are believed due; however the Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account number 11-0855.

Respectfully submitted,


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